

JANUARY 29, 1976

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ANNCR: THE VOICE OF AMERICA PRESENTS... SCIENCE NOTEBOOK ...A SUMMARY OF EVENTS IN SCIENCE, MEDICINE AND TECHNOLOGY. EACH WEEK AT THIS TIME, WE BRING YOU REPORTS ON DEVELOPMENTS THAT MAY AFFECT OUR DAILY LIVES. WITH THE FIRST STORY, HERE IS YOUR SCIENCE EDITOR -----.

(KIDNEY CELLS IN SPACE -- 3-2724 -- DOSA)

EDITOR: AN EXPERIMENT PERFORMED BY AMERICAN ASTRONAUTS DURING LAST JULY'S APOLLO-SOYUZ SPACE FLIGHT MAY LEAD TO THE DEVELOPMENT OF A NEW PROCESS FOR REMOVING BLOOD CLOTS FROM HUMAN VEINS AND ARTERIES. HERE IS ----- WITH A REPORT.

VOICE: UROKINASE IS THE NAME OF A CERTAIN ENZYME, A CHEMICAL SUBSTANCE, WHICH MAY BE USEFUL IN THE TREATMENT OF PEOPLE WITH BLOOD CLOT CONDITIONS, SUCH AS PHLEBITIS. THIS ENZYME IS NORMALLY PRODUCED BY SOME, BUT NOT ALL, CELLS IN THE HUMAN KIDNEY. IN FACT, ONLY ABOUT FIVE PERCENT OF THE KIDNEY CELLS HAVE THIS CAPABILITY AND SO FAR THERE HAS BEEN NO PRACTICAL WAY OF PUTTING THESE CELLS TO WORK TO PRODUCE UROKINASE BECAUSE IT HAS NOT BEEN POSSIBLE TO SEPARATE THE PRODUCING CELLS FROM THE REST OF THE KIDNEY CELLS.

VOICE:  
(CONT'D)

LAST JULY, THE APOLLO ASTRONAUTS PERFORMED AN EXPERIMENT TO ISOLATE PURE SAMPLES OF THE UROKINASE -- PRODUCING CELLS BY A PROCESS CALLED ELECTROPHORESIS. IN THIS PROCESS, KIDNEY CELLS ARE PLACED INTO A TUBE FULL OF WATER. AN ELECTRIC CURRENT IS INTRODUCED THROUGH ELECTRODES AT EACH END OF THE TUBE TO CREATE AN ELECTRIC FIELD. THIS ELECTRIC FIELD SERVES TO SEPARATE THE ORDINARY KIDNEY CELLS FROM THOSE CAPABLE OF PRODUCING UROKINASE.

ELECTROPHORESIS SOUNDS SIMPLE BUT IT JUST DOES NOT WORK WITH KIDNEY CELLS ON THE GROUND. THE REASON IS THAT THE EARTH'S GRAVITY INTERFERES WITH THE PROCESS. INSTEAD OF SEPARATING FROM EACH OTHER, THE KIDNEY CELLS SINK TO THE BOTTOM BECAUSE THEY ARE HEAVIER THAN THE WATER WHERE THE SEPARATION SHOULD TAKE PLACE.

IN EARTH ORBIT, WHERE EVERYTHING AND EVERYBODY BECOMES WEIGHTLESS, THE ASTRONAUTS SUCCEEDED IN SEPARATING THE UROKINASE -- PRODUCING CELLS. THEY FROZE THE SEPARATED SAMPLES AND BROUGHT THEM BACK TO EARTH WHERE SCIENTISTS USED THE CELLS AS A SEED, SO TO SPEAK, IN STARTING CELL CULTURES WHERE MORE SUCH CELLS COULD BE PRODUCED. THE EXPERIMENT WAS SUCCESSFUL AND THE CULTURES MADE FROM THE CELL SAMPLES THAT WERE RETURNED FROM SPACE, PRODUCED SIX TIMES MORE UROKINASE THAN THE ORIGINAL SAMPLES. THE SUCCESSFUL EXPERIMENT IN SPACE MAY LEAD TO A NEW PROCESS FOR MANUFACTURING DRUGS TO TREAT POTENTIALLY DEADLY BLOOD CLOTS.

(NEW METHOD OF BIRTH CONTROL -- 3- 2724 -- SEN/INDIA)

EDITOR: SCIENTISTS AT CENTRAL DRUG RESEARCH INSTITUTE IN LUCKNOW, INDIA, ARE COLLABORATING WITH THEIR AMERICAN COLLEAGUES IN DEVELOPING A BIRTH CONTROL METHOD. VOA'S PREMINDA SEN FILED THIS REPORT FROM INDIA:

VOICE: ASHA IS AN INDIAN WOMAN, LIVING IN A SMALL VILLAGE NEAR LUCKNOW. DESPITE THE EFFORTS OF GOVERNMENT FAMILY PLANNING WORKERS WHO HAVE BEEN ADVISING ASHA AND OTHER WOMEN IN HER VILLAGE, SHE WAS GETTING PREGNANT AGAIN AND AGAIN. THESE INDIAN WOMEN WERE AFRAID TO UNDERGO A RECOMMENDED OPERATION, CALLED TUBECTOMY, WHICH WOULD CUT OFF CERTAIN PASSAGES IN THEIR REPRODUCTIVE ORGANS AND PREVENT THEM FROM HAVING MORE CHILDREN.

SCIENTISTS AT THE LUCKNOW CENTRAL DRUG RESEARCH INSTITUTE ARE TRYING TO OVERCOME THIS FEAR OF TUBECTOMY. UNDER THE SPONSORSHIP OF THE WORLD HEALTH ORGANIZATION AND IN COOPERATION WITH DOCTOR ROBERT REICKART OF NEW YORK'S COLUMBIA UNIVERSITY, THE INDIAN RESEARCHERS ARE WORKING ON A NEW METHOD OF FERTILITY CONTROL. THE LUCKNOW INSTITUTE'S DOCTOR S.S. IYER DESCRIBES IT...

TAPE: CUT ONE -- IYER

"ONE OF THE METHODS BY WHICH YOU CAN CONTROL FERTILITY IN WOMEN IS BY TUBECTOMY. THAT MEANS THE SURGICAL METHOD OF CUTTING THE TUBES AND TYING THEM. NOW, WE HAVE THOUGHT OF USING SOME CHEMICALS FOR OCCLUDING THESE TUBES SO THAT THE PASSAGE IS BLOCKED WITHOUT ANY SURGICAL OPERATION."

VOICE: THE CHEMICAL STERIOD IS BEING USED TO BLOCK THE TUBES AND DOCTOR IYER EXPECTS IT TO REMAIN EFFECTIVE FOR AT LEAST TWO YEARS. CLINICAL TRIALS THUS FAR HAVE SHOWN NONE OF THE UNWELCOME SIDE EFFECTS ASSOCIATED WITH OTHER BIRTH CONTROL METHODS. BUT DOCTOR IYER SEES THE GREATEST ADVANTAGE OF THE TUBULAR OCCLUSION METHOD IN THE ADMINISTRATION OF MASS BIRTH CONTROL PROGRAMS...

TAPE: CUT TWO -- IYER

"WHEN WE HAVE TO DO A TUBECTOMY (THE SURGICAL PROCEDURE), WE HAVE TO GET THE PATIENT TO THE HOSPITAL. THIS MEANS THAT THE NUMBER OF BEDS YOU HAVE IN THE COUNTRY LIMITS THE NUMBER OF OPERATIONS. NOW, YOU SEE THE MAGNITUDE OF THE PROBLEMS THAT ARISE. BUT WITH THE TUBAL OCCLUSION METHOD IT CAN ALL BE DONE OUTDOORS WITHIN TEN MINUTES. THIS IS ONE OF THE GREATEST ADVANTAGES OF ANY METHOD OF FERTILITY CONTROL."

VOICE: THE WORLD HEALTH ORGANIZATION HAS GIVEN THE INSTITUTE A GRANT OF TWENTY THOUSAND DOLLARS, MAINLY IN THE FORM OF EQUIPMENT AND CHEMICALS. AND THE FAMILY PLANNING PROGRAM OF INDIA EXPECTS TO ADD THE TUBAL OCCLUSION METHOD TO ITS TECHNIQUES QUITE SOON.

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(SELF-FOGGING WINDOW -- 3-2724 -- DOSA)

EDITOR: GREENHOUSE GROWERS OF FLOWERS AND VEGETABLES MUST SPEND LARGE SUMS OF MONEY EACH SPRING TO APPLY WHITEWASH TO THE GLASS WALLS OF THEIR GREENHOUSES TO PROTECT THE PLANTS INSIDE FROM THE DIRECT RAYS OF THE SUN. AND AT THE END OF SUMMER, THEY HAVE TO REMOVE THE WHITEWASH -- ANOTHER CONSIDERABLE EXPENSE. BUT A NEW KIND OF WINDOW MAY CHANGE ALL THAT. ----- HAS THE STORY.

VOICE: PENNSYLVANIA STATE UNIVERSITY SCIENTISTS, WORKING WITH THE FINANCIAL SUPPORT OF THE U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION, ARE DEVELOPING A WINDOW THAT "FOGS ITSELF" TO KEEP OUT EXCESSIVE HEAT. IT IS MADE OF TWO TRANSPARENT PLASTIC SHEETS, WITH A CLEAR FLUID BETWEEN THEM. THE FLUID TURNS MILKY WHITE WHEN IT REACHES A CERTAIN TEMPERATURE AND TURNS CLEAR AGAIN WHEN THE TEMPERATURE GOES DOWN.

DOCTOR K. VEDAM, OF PENNSYLVANIA STATE UNIVERSITY'S MATERIALS RESEARCH LABORATORY SAYS, THE FLUID ACTS LIKE A SWITCH. IT IS A COMPOSITE OF TWO LIQUIDS WHICH, WHEN MIXED AT ROOM TEMPERATURE, OR LOWER, REMAIN COMPLETELY TRANSPARENT. WHEN HEATED, HOWEVER, ONE OF THE LIQUIDS BEGINS TO COLLECT IN TINY DROPLETS, IN A KIND OF A SUSPENSION, WITHIN THE SECOND LIQUID. THE ACCUMULATING DROPLETS SWITCH THE ENTIRE MIXTURE FROM A TRANSMITTER TO A REFLECTOR OF SUNLIGHT.

THE PROTOTYPE OF THE NEW KIND OF GLASS IN DOCTOR VEDAM'S LABORATORY IS SO SENSITIVE THAT THE HEAT FROM A FINGER IS ENOUGH TO MAKE THE LIQUID UNDERNEATH TURN WHITE. AND THE PENNSYLVANIA SCIENTIST BELIEVES THAT ONCE IT CAN BE MASS-PRODUCED, THE SELF-FOGGING WINDOW COULD BE USED IN ORDINARY HOMES, OR THE LIQUID MIGHT BE APPLIED TO EXISTING WINDOWNS, GREATLY REDUCING THE COST OF AIR-CONDITIONING DURING THE HOT SUMMER MONTHS.

(OCEAN STUDY IN A LAKE -- 3-2724 -- DOSA)

EDITOR: OREGON STATE UNIVERSITY OCEANOGRAPHERS IN THE NORTHWESTERN UNITED STATES FIND THAT SOMETIMES IT IS EASIER TO STUDY THE OCEAN IN AN INLAND LAKE, TWO-HUNDRED-FORTY KILOMETERS FROM THE NEAREST COAST, THAN AT SEA. HERE IS----- WITH A REPORT.

VOICE: THE CRYSTAL-CLEAR WATER OF BLUE LAKE IN THE CASCADE MOUNTAINS IS BEING USED BY OCEANOGRAPHERS IN THEIR STUDIES OF VERTICAL HEAT TRANSPORT. THEY BELIEVE THAT LEARNING OF THE WARMING AND COOLING PROCESSES AT VARIOUS DEPTHS IN THE LAKE WILL HELP UNDERSTAND THE COMPLEX HEAT TRANSFER PROCESSES IN THE OCEAN. SUCH A STUDY WOULD BE EXTREMELY DIFFICULT IN THE OCEAN ITSELF BECAUSE OF THE TREMENDOUS COMPLICATIONS CAUSED BY THE TIDES, WAVES, UPWELLING, AND SO ON.

BY USING BLUE LAKE AS A LABORATORY, THE SCIENTISTS CAN FOCUS ON PRECISE TEMPERATURE MEASUREMENTS ALL THE WAY FROM THE LAKE'S SURFACE TO ITS BOTTOM SOME ONE-HUNDRED METERS DOWN. THEY ARE USING EXTREMELY SENSITIVE INSTRUMENTS WHICH CAN MEASURE TEMPERATURE CHANGES TO AN ACCURACY OF ONE-THOUSANDTH OF A DEGREE. SUCH FINE-SCALE MEASUREMENTS MAKE IT POSSIBLE TO IDENTIFY SMALL-SCALE HEAT ACTIVITIES IN THE LAKE AND IN THE OCEAN. IN THE WORDS OF OCEANOGRAPHER DOUGLAS CALDWELL, THE SCIENTISTS "CAN KNOW WHAT IS GOING ON FROM WEEK TO WEEK, AND MORE IMPORTANT, WHAT IS HAPPENING FROM SEASON TO SEASON."

VOICE:  
(CONT'D)

ANOTHER REASON OCEANOGRAPHERS ARE INTERESTED IN TEMPERATURE CHANGES IN BLUE LAKE IS THAT THE TRANSFER OF HEAT AT THE SURFACE FROM THE AIR TO THE WATER AND DOWN THROUGH THE WATER, IS REGARDED AS ONE OF THE MOST IMPORTANT PHYSICAL PROCESSES IN NATURAL BODIES OF WATER, WHETHER THEY ARE SMALL LAKES OR GREAT OCEANS.

SUMMER HEATING DEVELOPS LAYERS IN LAKES, WITH OXYGEN CONCENTRATING IN THE UPPER AREA AND NUTRIENTS IN THE LOWER LAYERS. IN THE SPRING AND FALL, WHEN WATER TEMPERATURES EVEN OUT FROM THE SURFACE TO THE BOTTOM, A KIND OF "OVERTURNING" OCCURS, A MIXING OF THE OXYGEN AND NUTRIENT LAYERS. THIS PROCESS IS VERY IMPORTANT TO THE LAKE'S PRODUCTIVITY, ESPECIALLY THE RECIRCULATION OF THE NUTRIENTS DURING THE PERIODS OF "OVERTURN."

A SIMILAR MIXING TAKES PLACE IN THE OCEANS. THERE, IT IS BROUGHT ABOUT BY THE ACTION OF THE WIND WHICH CAUSES THE NUTRIENT-RICH, COLD WATER TO RISE TO THE SURFACE. AND THE KNOWLEDGE GAINED IN THE WATERS OF BLUE LAKE AND SIMILAR INLAND LAKES WILL HELP OCEANOGRAPHERS LEARN MORE ABOUT THE HEAT PROCESSES IN THE WORLD'S OCEANS AND THEIR EFFECT ON GLOBAL WEATHER.

(WRISTBAND TELEVISION -- 3-2724 -- DOSA)

EDITOR: TELEVISION SCREENS WORN ON THE WRIST LIKE A WATCH WERE INVENTED BY SCIENCE FICTION WRITERS MANY YEARS AGO. BUT NOW IT SEEMS THAT, ONCE AGAIN, REALITY IS ABOUT TO CATCH UP WITH FICTION. ----- HAS DETAILS.

VOICE: THERE ARE ALREADY WRISTWATCHES WHICH SHOW THE TIME AND DATE IN GLOWING NUMERALS. MANY OF THESE WATCHES OPERATE WITH A CRYSTAL-LIKE SUBSTANCE WHICH STARTS TO GLOW WHEN IT'S EXPOSED TO AN EXTREMELY LOW ELECTRIC CURRENT. UNITED STATES AIR FORCE SCIENTISTS ARE WORKING ON THE DEVELOPMENT OF SO-CALLED LIQUID CRYSTAL TELEVISION SCREENS, ABOUT TWELVE SQUARE CENTIMERS IN SIZE AND JUST A FEW MILLIMETERS THICK. WHEN THEY ARE CONNECTED TO A TELEVISION CAMERA OR RECEIVER, THESE MINIATURE SCREENS PRODUCE A SHARP AND VERY BRIGHT PICTURE. THE PICTURE IS SO BRIGHT THAT EVEN DIRECT SUNLIGHT CANNOT REDUCE ITS INTENSITY. THE AIR FORCE NEEDS THE LIQUID CRYSTAL TELEVISION SCREEN FOR USE IN AIRPLANE COCKPITS WHERE PILOTS MUST BE ABLE TO READ THEIR INSTRUMENT DISPLAYS IN THE BRIGHTEST SUNLIGHT. THE EXPERIMENTAL DEVICE HAS FORTY-THOUSAND PICTURE ELEMENTS CRAMMED INTO A TINY AREA. AS GROUPS OF THESE ELEMENTS LIGHT UP, THEY APPEAR AS A PICTURE TO THE HUMAN EYE.

SCIENTISTS SAY THE LARGE NUMBER OF THE PICTURE ELEMENTS ASSURES THE RELIABILITY OF THE DEVICE. WHEN A CONVENTIONAL CATHODE RAY TUBE TELEVISION SCREEN BURNS OUT, THE PICTURE DISAPPEARS. BUT WITH THE FORTY-THOUSAND PICTURE ELEMENTS



VOICE: OF THE LIQUID TELEVISION SCREEN, IT DOES NOT MATTER IS A  
(CONT'D) FEW HUNDRED, OR THOUSAND, OF THEM BURN OUT. ENOUGH  
ELEMENTS REMAIN TO DISPLAY A SMALL TELEVISION PICTURE.  
IT IS A DISTINCT POSSIBILITY THAT ONE DAY, BEFORE TOO  
LONG, WE WILL HAVE LIQUID CRYSTAL WRISTBAND TELEVISION,  
-- SCIENCE FICTION COME TRUE.

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ON DEVELOPMENTS THAT MAY AFFECT OUR DAILY LIVES. THIS  
IS -----.

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WJL/CAK